Physical education classes, physical activity, and sedentary behavior in children

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ABSTRACT

Purpose: To examine the associations between participation frequency in Physical Education (PE) classes and objective measures of physical activity (PA) and sedentary behavior (SB) in children from 12 countries at different levels of development.

Methods: This multinational, cross-sectional study included 5,874 children aged 9-11 years from sites in Australia, Brazil, Canada, China, Colombia, Finland, India, Kenya, Portugal, South Africa, the United Kingdom and the United States. PA and SB were monitored over 7 consecutive days using a waist-worn accelerometer. PA and SB data were presented for weekdays (times in- and out-of-school) and weekend days. Participation frequency in PE classes was determined by questionnaire. Multilevel modeling analyses stratified by sex were used.

Results: Overall, 24.8% of children self-reported participation in PE classes ≥ 3 times/week (25.3% in high-income countries [HIC], and 24.3% in low- and middle-income countries [LMIC]). After adjusting for age, sex, parental education and body mass index z-score, results showed that children from LMIC who took PE classes 1-2 times/week were more likely to present better indicators of PA and shorter time in SB in- and out-of-school. In HIC, boys that participated in PE classes were more likely to meet the moderate-to-vigorous PA (MVPA) recommendations and to present better indicators of PA (in school) and shorter time in SB in- and out-of-school. For girls in HIC, attending PE classes increased the likelihood of spending more time in MVPA, especially if they attended ≥ 3 times/week.

Conclusion: Attending PE classes is associated with a higher level of PA and lower level of SB in- and out-of-school during weekdays in children from countries at various levels of development.

Keywords: CROSS-SECTIONAL STUDY, EPIDEMIOLOGY, EXERCISE, GLOBAL HEALTH, SCHOOL HEALTH.

INTRODUCTION

Physical activity (PA) and sedentary behavior (SB) are distinct behaviors that affect the health of children (1-3). The two movement behaviors have different determinants and because levels of PA and SB around of the world are concerning, these behaviors represent major challenges for public health authorities (4). According to a study coordinated by the Active Healthy Kids Global Alliance (4), which compiled data from 38 countries, more than 60% of children do not meet the recommended 60 minutes of daily moderate-to-vigorous PA (MVPA). Likewise, more than 60% of children spend more than two hours a day on recreational screen time (4), exceeding public health recommendations of some countries (5).

The school environment is a context where young people spend much of the day assimilating knowledge about different topics, including health. In this way, the school environment is conducive to informing children about the benefits of regular PA and the importance of preventing excessive SB throughout the day (4). In addition to guiding and educating young people about these lifestyle behaviors, schools play a key role in providing structured and unstructured PA (4). One opportunity for this to happen is through Physical Education (PE) classes (6,7). The importance of PE classes for the PA of children has been highlighted in guidelines from various countries where it is recommended that young people engage in MVPA for at least 50% of PE class time (6,7).

The discussion of PE classes in the guidelines comes from a series of studies that showed that participation frequency in PE was associated with higher levels of PA and lower levels of SB on days with PE classes and on days without PE classes (8,9). However, equivocal findings are also reported in the literature (18). Specifically, the association between participation frequency in PE classes and PA and SB may differ depending on age, sex, or weight status (10). Two explanations have been proposed to explain these equivocal observations. First, Dishman et al. (11) suggested that the practice of PA, at any intensity, causes changes at the level of the brain that stimulate vigor and more movement throughout the day. Thus, it can be inferred that children who engage in PE classes will tend to be more physically active on different days (week days and weekend days) or vice versa. Second, the "activitystat" hypothesis suggests that there is an energy expenditure threshold for children and, once reached, the rest of the daily time may be compensated with little or no PA on the same day or on other days of the week (12,13). From this theory, it can be inferred that participation frequency in PE classes may help to reach this threshold of energy expenditure and, on PE days, the PA time for the rest of the day will be decreased. Both explanations (11-13) do not give details about the differences that may exist between boys and girls that have been identified as one of the factors that can modify the association between participation frequency in PE classes and PA and SB time (10).

Previous studies that have investigated the association between participation frequency in PE classes and PA and SB levels throughout the day have typically been developed with samples of students from a single city or country, and most of these studies have been conducted in high-income countries (HIC) (9,14,15). The few studies in low- and middle-income countries (LMIC) have used subjective measures of PA and SB, which likely impacts the accuracy of estimates reported (16,17). In order to overcome limitations of previous studies, the present analysis aims to examine the association between participation frequency in PE classes and objective measures of PA and SB throughout the day, both on weekdays (in- and out-of-school) and weekend days in children from 12 countries.

METHODS

Study Design and Setting

The International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) is a cross-sectional, multinational study designed to examine the relationships between lifestyle behaviors and obesity in children in 12 study sites located in Australia, Brazil, Canada, China, Colombia, Finland, India, Kenya, Portugal, South Africa, the United Kingdom, and the United States. These countries represent a wide range of economic development (low to high income), Human Development Index (0.509 in Kenya to 0.929 in Australia), and income inequality (Gini index of 26.9 in Finland to 63.1 in South Africa) (18). The rationale, design, and methods of ISCOLE have previously been published in detail elsewhere (18). The primary sampling frame was schools, which were typically stratified by an indicator of socioeconomic status (SES) to maximize variability within sites. Each study site identified one or more school districts (within reasonably close proximity to the local study center), to provide a sufficient population to draw a sample of 500 students. A standardized protocol was used to collect data across all sites, and all study personnel underwent rigorous training and certification to ensure data quality. The Pennington Biomedical Research Center Institutional Review Board as well as Institutional/Ethical Review Boards at each site approved the study. Written informed consent was obtained from parents/legal guardians, and child assent was also obtained as required by local ethics review boards. Data were collected during the school year at each study site and occurred between September 2011 and December 2013.

Participants

ISCOLE targeted grade levels likely to ensure minimal variability around a mean age of 10 years. All children within the targeted grade level in a sampled school were eligible to participate; hence, the sample included 9-11 year-old children. Based on a priori sample size and power calculations (18), each site aimed to recruit a sex-balanced sample of at least 500 children. The response rate in ISCOLE was 60.0% (children with consent to participate divided by consents distributed). Of the 7,372 children who participated in ISCOLE, a total of 5,874 remained in the final analytical sample. We excluded participants without valid accelerometry (n=1,214), information on participation frequency in PE classes (n=24), reported level of parental education (n=255), or body mass index (BMI) z-score (n=5). Children who were excluded for missing data did not significantly differ in their descriptive characteristics from those who were included in the present analysis (see Table, Supplemental Digital Content 1).

Measurements

Physical Activity and Sedentary Time

Vigorous PA (VPA), moderate PA (MPA), MVPA, light PA (LPA), total PA (TPA = MVPA + LPA), and total sedentary time were objectively-assessed using 24-h, waist-worn accelerometry (19). An Actigraph GT3X+ accelerometer (ActiGraph LLC, Pensacola, FL, USA) was worn at the waist on an elasticized belt at the right mid-axillary line. Participants were encouraged to wear the accelerometer 24 h per day (removing only for water-based activities) for at least 7 days, including 2 weekend days. Overall, mean 24-h wear time and wake wear time were 22.6 h/day and 14.9 h/day in ISCOLE, respectively. The minimum amount of non-sleep data that was considered acceptable for inclusion was at least 4 days with at least 10 h of wake wear time per day, including at least 1 weekend day (19). Data were collected at a sampling rate of 80 Hz, downloaded in 1-s epochs with the low-frequency extension filter using the ActiLife software version 5.6 or higher (ActiGraph LLC, Pensacola, FL, USA), and reintegrated to 15-s epochs for analysis. After exclusion of sleep period time (20,21) and awake non-wear time (any sequence of ≥20 consecutive minutes of zero activity counts), VPA was defined as activity ≥1003 counts/15 s, MPA was defined as all activity ≥574 counts/15 s and <1003 counts/15 s, MVPA was defined as all activity ≥574 counts/15 s, LPA was defined as all activity >25 counts/15 s and <574 counts/15 s, and total sedentary time as all movement ≤25 counts/15 s, consistent with the widely used Evenson cutoffs (22). MVPA and SB were analyzed considering the average of weekdays and weekend days. The weekdays were divided as “in-school” and “out-of-school”, with out-of-school comprising the time before and after school. The before school time period was considered from sleep onset wake (established using a validated algorithm (20)) until school start time, “in-school” was defined as the time between school start and end times (determined individually for each participating school), and the after school period was from school end time through the child’s bedtime (also determined by our validated algorithm (20) determined from accelerometry). Full details on how wake time was determined are reported in previous studies by the ISCOLE group (19-21).

Children were classified as meeting the MVPA recommendation of an average of ≥60 min/day, or not (5,23). In addition, each PA intensity (min/day) and the overall SB time (min/day) were categorized according to the distribution tertile for boys and girls. We chose this classification because there are no specific recommendations for each PA intensity and the overall SB time. Sensitivity analyses using other cut-points for PA and SB revealed similar patterns of associations; therefore, only tertiles are presented in the present paper.

Participation frequency in PE classes

Participation frequency in PE classes was assessed using a self-report questionnaire item from the U.S. Youth Risk Behavior Surveillance System (24). The students were asked: “In the last week you were in school, on how many days did you go to physical education (PE) classes?” Response options ranged from zero days to five days. In the present study, responses were classified into three categories, "0 days/week", "1-2 days/week", and "≥3 days/week" to maximize power and because the results of the associations between participation frequency in PE classes and PA/SB for 3, 4, and 5 days/week were similar.

Covariates

Age, sex, level of parental education, and BMI z-scores were included as covariates. These variables were chosen because of their association with the dependent and independent variables in previous studies (9,15,25,26). Age was computed from birthdates and measurement dates, and sex was self-reported on a questionnaire. The level of parental education was reported by the parents themselves in a questionnaire sent to them (18). Highest level of parental education was used as a proxy measure for family SES and coded into three categories based on the highest level of education attained by either parent: “did not complete high school”, “completed high school or some college”, or “completed bachelor’s or postgraduate degree”. Body mass was measured with a Tanita SC-240 scale (Arlington Heights, IL, USA), after all outer clothing, heavy pocket items and shoes were removed. Body height was measured without shoes using a Seca 213 portable stadiometer (Hamburg, Germany), with the participant’s head in the Frankfort horizontal plane and after a deep inspiration. Each measurement was repeated, and the average was used for analysis (a third measurement was obtained if the first two measurements were greater than 0.5 kg or 0.5 cm apart for body mass and body height, respectively, and the average of the two closest measurements was used for analysis). BMI (kg/m^2) was calculated, and BMI z-scores were computed using age- and sex-specific reference data from the World Health Organization (27).

Statistical Analysis

The analyses were performed for the whole sample, stratified by sex and country-level World Bank classification of economic development. Descriptive statistics (absolute frequency, relative frequency, mean values and standard deviations) on the characteristics of the sample were presented for each site and for the set of sites from countries classified as HICs (Australia, Canada, Finland, Portugal, United Kingdom, United States) and LMICs (Brazil, China, Colombia, India, Kenya, South Africa), in accordance with the recommendations of the World Bank (28). A multi-level logistic mixed regression model was used where the dependent variable was meeting the MVPA recommendations (5,23). Multi-level polytomous logistic mixed regression models were used (29,30), where the dependent variables were the various PA indices, with a model for each (VPA, MPA, MVPA, LPA, TPA), and SB (sex-specific reference categories = 1st (lowest) tertile for PA indices and 3rd (highest) tertile for SB). Odds ratios and 95% confidence intervals were estimated. Study sites were considered to have fixed effects and schools nested within study sites were viewed as having random effects. Age, sex (with models containing the whole sample), parental education, and BMI z-scores were included as covariates. Statistical analyses were performed using Stata 13.0 software (STATA Corp. College Station, Texas, USA). The level of statistical significance was set at $p<0.05$.

RESULTS

This study analyzed data from 5,874 children (45.6% male) from 12 countries, with an average age of 10.4 ± 0.6 years old (Table 1). Average MVPA was 60.3 ± 24.8 min/day, average VPA was 17.9 ± 11.1 min/day, average MPA was 42.4 ± 5.6 min/day, and average LPA was 314.9 ± 52.7 min/day. Total sedentary time was 513.4 ± 69.2 min/day. Table 1 also presents this information for each country and according to the country-level World Bank classification of economic development (HIC and LMIC). Supplemental Digital Content 2 and 3 present these results for boys (see Table, Supplemental Digital Content 2) and girls (see Table, Supplemental Digital Content 3).

In the full sample (n = 5,874) (see Figure 1), 24.8% of children self-reported participation frequency in PE classes three or more times per week (25.3% in HIC and 24.3% LMIC, $p > 0.05$). The country that had most students reporting attending PE classes for three days or more in the week was Canada (64.8%). Portugal was the country with the greatest proportion of children reporting attending PE classes once or twice a week (99.0%). South Africa was the country with the greatest proportion of students not attending PE classes (32.1%). These results were similar when analyzing boys (see Figure, Supplemental Digital Content 4) and girls (see Figure, Supplemental Digital Content 5) separately.

In general (Table 2), 44.4% of the sample met the recommendations for MVPA, with a greater adherence in Finland (63.8%) and a lower adherence in China (15.9%). The highest proportion of children who spent more time in VPA was found in Finland (53.0%) and the lowest in India (12.3%). The highest proportion of children who spent more time in MPA was found in Colombia (55.7%) and the lowest in China (8.1%). The highest proportion of children who spent more time in LPA was found in Brazil (49.0%) and the lowest in Finland (14.0%) and the UK (14.0%). The highest proportion of children who spent less time on SB was found in Australia (52.5%) and the lowest in China (9.5%). Full details for all PA indices and SB in- and out-of-school are provided in Table 2 (full sample) and in Supplemental Digital Content (boys: see Table, Supplemental Digital Content 6; girls, see Table, Supplemental Digital Content 7).

As shown in Table 3, children from LMIC who participated in PE classes at least 1-2 times/week were more likely to meet the MVPA recommendations (male – OR: 1.80; 95% CI: 1.17; 2.77; female – OR: 2.17; 95% CI: 1.44; 3.27), to spend more time at different PA intensities, and to have shorter SB time than those who did not attend PE classes. In HIC, there were differences between boys and girls, where boys participating in PE classes were more likely to meet the recommendations for time spent in MVPA and VPA, and shorter SB time. For girls from HIC, attending PE classes increased the likelihood of spending more time in MVPA (OR: 2.42; 95% CI: 1.22; 4.80) and MPA (OR: 2.44; 95% CI: 1.25; 4.75), especially if they attended three or more classes/week.

As reported in Table 4, children from LMIC who participated in PE classes 1-2 times/week were more likely to spend more time in MVPA out of school on weekdays (male - OR: 2.39; 95% CI: 1.43; 3.99; female: 2.79, 95% CI: 1.71, 4.58). Children from LMIC (male - OR: 3.23; 95% CI: 1.82; 5.71; female - OR: 7.27; 95% CI: 4.39; 12.05) and HIC (male - OR: 5.87; 95% CI: 2.78; 12.35; female - OR: 3.47; 95% CI: 1.77; 6.82) who participated in PE classes three or more times/week were more likely to spend more time on MVPA at school. Girls from LMIC that had at least 1-2 PE classes/week were more likely to spend more time in MVPA on weekends (OR: 1.86; 95% CI: 1.17; 2.95).

As shown in Table 4, children of both sexes from LMIC (male - OR: 2.23; 95% CI: 1.23; 4.05; female - OR: 2.76; 95% CI: 1.56; 4.88) and the boys from HIC (OR: 2.45; 95% CI : 1.09; 5.51) who participated in 3 or more PE classes/week were more likely to spend less time in SB out of school on weekdays. For in-school SB time, the children who presented the highest odds of spending shorter time in SB were boys (OR: 3.33, 95% CI: 1.97; 6.63) and girls (OR: 4.87; 95% CI: 2.94; 8.06) from LMIC, and boys (OR: 2.40; 95% CI: 1.01; 5.81) from HIC who took 3 or more PE classes/week. For the time in SB on weekends, no significant associations were found.

DISCUSSION

The main finding of the present study was that participation frequency in PE classes was related to greater odds of children demonstrating desirable indicators of PA and SB daily behaviors. In addition, participation frequency in PE classes was associated with longer time spent in MVPA and shorter time in SB in- and out-of-school on weekdays, especially in children from LMIC. These results were more evident in LMIC, where at least one PE class/week represented improvements in PA and SB indicators. For HIC, the results were more evident in boys and with participation frequency in ≥3 PE classes/week.

The health benefits of participation frequency in PE classes for children have been reported in previous studies (31-34). A shared explanation provided by these authors for the improvement in health indicators of children who participated in PE classes was that PE class attendance was associated with greater involvement in PA in general. The present study supports these findings by showing better indicators of PA and SB in- and out-of-school for children who report attending PE classes.

Similar to the present study, other studies have also found an association between participation frequency in PE classes and higher PA levels and lower SB levels in children (8,9,25). A cross-sectional study with children from Estonia measured PA and SB by accelerometry during PE classes and during the remainder of the day. The authors found that only one third of PE classes was spent on MVPA and the rest was spent on LPA and SB. However, Estonian children who participated in PE classes had shorter SB time and greater MVPA involvement throughout the day than peers who did not take PE classes (9). A study conducted with school-aged children from the US measured PA using SenseWear armband monitor (BodyMedia®, Pittsburg, US) during weekdays and weekends. The authors found that the students were less sedentary and more physically active for the rest of the day following the classes on PE days (8). In Brazilian children, it was reported that at least one PE class/week was associated with less time in SB throughout the day (25). Although the present study did not discriminate the measurement of PA and SB during the PE class, we can hypothesize that involvement in PE classes is a stimulus to keep young people more physically active and less sedentary throughout the day. This hypothesis was supported because the children in this study who participated in PE classes had more time in MVPA and less time in SB in- and out-of-school on weekdays. The rationale for this hypothesis is that the practice of PA, regardless of intensity, causes changes in the cerebral cortex and neurophysiological stimulation and can reduce the sensation of fatigue throughout the day, while improving mood and the willingness to keep moving (11). Another possible explanation would be that PE classes make children familiar and more confident with physical activity, which increases the possibility of engaging in other activities out of school (35).

Some studies examining the moderators of the relationship between participation frequency in PE classes and PA/SB throughout the day have found no associations

(10,14,15). According to these authors, sex, weight status and lesson content are key moderators of this association. For example, no association was found between participation frequency in PE classes and PA/SB levels throughout the day in overweight and obese girls. On the other hand, participation frequency in PE classes contributed significantly to higher LPA in the normal-weight girls and boys during the school day (15). Nettlefold et al. (10) also reported no association between participation frequency in PE classes and PA levels throughout the day for children in Vancouver, Canada. One justification found in the literature for the null findings observed between involvement in PE classes and PA/SB levels throughout the day is the ‘‘activitystat’’ hypothesis, which suggests that children have an energy expenditure set point and, therefore, compensate for increased PA in one part of the day by decreasing PA later (12,13). The present study did not confirm this hypothesis because the participation in PE classes was associated with greater involvement in MVPA and less time spent in SB in- and out-of-school on weekdays.

The present study investigated whether the country-level World Bank classification of economic development modified the associations found between participation frequency in PE classes and PA/SB. We observed that the relationship between participation frequency in PE classes and PA/SB levels of children was related to the development status/income level of the country. The literature has already reported that levels of PA and SB vary according to the development status/income level of the country and family SES (15,17,28). A recent systematic review and meta-analysis of studies with school-aged children revealed that in HIC, family SES was inversely associated with SB, whereas in low/middle-income countries, there was a positive association between family SES and SB (36). A systematic review revealed that school-aged children in Sub-Saharan Africa (low income region) with higher family SES were less physically active and spent more time on SB than those with lower family SES (37). The present study added the component of PE classes to this discussion between different income levels with the understanding that PE classes are opportune moments in the school day for young people to practice PA. However, we did not stratify analyses by income level of the families in each group of countries to protect against type 2 error (i.e., we sought to retain power in the statistical analyses). Thus, it is suggested that future studies with larger samples make this stratification.

This study found that in LMIC, participation frequency in at least one PE class was associated with higher levels of PA and lower SB levels. In HIC, this result was most evident in male children only or those attending three or more PE classes/week. A possible explanation for these differences is that countries implement different strategies and policies to promote PA and healthy habits for children (4). The Active Healthy Kids Global Alliance organizes and prepares Report Cards on the PA of children and youth from different countries around the world. This program revealed that government actions and policies to encourage and promote PA are more evident in HIC, and some LMIC do not have government policies to encourage PA, including in the school environment (4). Based on this evidence and the results of the present study, it is deduced that participation frequency in PE classes in LMIC represents an important avenue for young people to engage in PA throughout the day in- and out-of-school. In this study, young people who did at least one PE class/week were more likely to be classified as having higher levels of PA of different intensities and with lower SB than those who did not take PE classes.

For HIC, the literature reports greater incentives and government actions to promote PA, both in- and out-of-school (4,38,39). For activities at school, the justification given is that schools in HIC provide built environments more suitable for the practice of PA when compared to LMIC (4,38,39). For out-of-school activities, the justification is not centered only on the built environment but also on the opportunities for young people to engage in targeted PA practice in periods outside of school (4,39). It is possible that these other structured and unstructured activities (compared to PE classes), inside and outside of the school, represent the largest portion of the students' time spent on PA (38).

This study found that for some PA and SB indicators, at least 1-2 PE classes/week represented higher odds to spend more time in PA and shorter time in SB, and that to do three or more PE classes/week did not represent greater odds. Thus, there was no dose-response relationship between participation frequency in PE classes and PA and SB throughout the day. We can speculate that the quality of PE classes is as important as the frequency of these classes. Fröberg et al. (14) reported that the contents that are discussed in PE classes can be facilitators or barriers to PA in children. Perhaps even a small dose (e.g., 1 or 2 PE classes per week) can achieve desirable outcomes. In this regard, it is recommended that the contents of the PE classes be promoters of an active lifestyle of the children.

There are several limitations in the present study. First, the cross-sectional design precludes us from making cause-and-effect inferences. Second, we cannot exclude the possibility that unmeasured confounding variables may explain some of the observed relationships. Third, we did not evaluate the PA level and the SB level during PE classes and, therefore, we do not know the behavior pattern of the students during PE classes. Fourth, we objectively assessed PA and SB using accelerometry; however, a limitation of this approach is the inability to quantify some physical activities such as cycling and swimming. Five, the sample of 12 countries involved in the survey was not nationally representative and not represent the behavior pattern of any particular country, though the samples were generally quite comparable to other nationally representative surveys (40). Finally, the participation frequency in PE classes was self-reported and information on the PE curriculum was not collected. The strength of this study was in the recruitment of a large multinational sample of children from LMIC across several regions of the world, the highly standardized measurement protocol, the use of objective measurements whenever possible, and the rigorous quality control program.

In conclusion, participation frequency in PE classes was associated with healthy indicators of PA and SB throughout the day in children from around the world. Participation frequency in PE classes also resulted in longer time spent in MVPA and shorter time in SB in- and out-of-school on weekdays. These results were more evident in LMIC, where at least one PE class/week was associated with the desirable indicators of PA and SB. For HIC, these results were more evident in boys and those attending three or more PE classes/week. Collectively, PE classes seem to represent an opportunity to positively influence PA and SB levels of children, especially those from LMIC.

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Conflict of Interest

The authors declare no conflicts of interest.

The results of the present study do not constitute endorsement by the American College of Sports Medicine.

The authors declare that the results of the study are presented clearly, honestly, and without fabrication, falsification, or inappropriate data manipulation.

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Table 1. Descriptive characteristics of the sample.

Country (site)	Participants	Age (years)	MVPA	VPA	MPA	LPA	TPA	SB	MVPA out of school*	MVPA in school*	MVPA on weekends	SB out of school*	SB in school*	SB on weekends
	(n, % males)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
All sites	5874 (45.6)	10.4 (0.6)	60.3 (24.8)	17.9 (11.1)	42.4 (15.6)	314.9 (52.7)	375.2 (64.6)	513.4 (69.2)	36.3 (19.4)	25.8 (13.6)	55.4 (31.9)	292.9 (67.5)	233.8 (61.3)	488.7 (92.3)
HIC	2779 (43.5)	10.5 (0.5)	60.4 (23.0)	19.0 (11.4)	41.4 (13.5)	301.9 (48.2)	362.3 (58.6)	516.3 (66.8)	35.5 (17.1)	27.6 (12.6)	53.4 (29.5)	301.6 (61.0)	224.1 (47.5)	502.9 (91.6)
Australia (Adelaide)	439 (46.0)	10.7 (0.4)	65.2 (23.1)	22.5 (11.8)	42.7 (13.0)	310.1 (47.8)	375.3 (59.3)	476.8 (59.9)	35.0 (14.7)	34.6 (13.4)	55.7 (30.4)	269.9 (45.9)	210.8 (32.1)	475.7 (88.9)
Canada (Ottawa)	502 (41.2)	10.5 (0.4)	58.6 (19.4)	16.8 (9.0)	41.8 (12.1)	304.7 (44.5)	363.3 (54.6)	511.6 (62.9)	32.4 (14.2)	29.6 (9.9)	49.7 (24.2)	295.9 (49.2)	215.3 (29.9)	518.2 (86.6)
Finland (Helsinki, Espoo and Vantaa)	434 (46.4)	10.5 (0.4)	70.8 (26.2)	23.2 (13.9)	47.6 (15.1)	293.4 (43.7)	364.2 (58.4)	528.9 (67.1)	48.7 (21.8)	26.3 (12.0)	60.9 (34.2)	372.7 (66.3)	164.2 (30.0)	519.5 (89.2)
Portugal (Porto)	578 (43.4)	10.5 (0.3)	56.0 (21.8)	16.8 (10.1)	39.2 (13.4)	301.8 (50.0)	357.8 (59.7)	552.6 (61.3)	30.6 (14.7)	29.4 (12.9)	43.9 (25.4)	312.7 (48.7)	248.1 (34.7)	543.6 (81.3)
UK (Bath and North East Somerset)	377 (43.5)	10.9 (0.5)	64.2 (22.4)	20.9 (11.5)	43.3 (12.9)	286.1 (45.5)	350.3 (55.9)	495.2 (58.8)	39.3 (16.7)	27.8 (11.1)	58.3 (29.8)	283.7 (44.1)	223.2 (31.1)	483.1 (85.4)
USA (Baton Rouge)	449 (41.1)	9.9 (0.6)	49.9 (18.8)	15.1 (9.2)	34.8 (11.1)	313.7 (50.9)	363.6 (60.5)	520.4 (61.3)	30.2 (12.9)	17.3 (8.7)	56.1 (30.3)	271.2 (46.4)	273.8 (34.1)	461.9 (90.7)
LMIC	3095 (47.4)	10.3 (0.6)	60.1 (26.3)	16.9 (10.7)	43.2 (17.4)	326.9 (53.8)	387.0 (67.6)	510.6 (71.2)	36.9 (21.1)	24.2 (14.3)	57.3 (33.8)	285.1 (72.0)	242.6 (70.3)	475.9 (90.9)

Brazil (Sao Paulo)	435 (49.0)	10.5 (0.5)	59.4 (26.2)	17.7 (11.3)	41.7 (16.6)	337.9 (53.1)	397.3 (67.9)	500.6 (68.4)	36.4 (21.4)	24.8 (18.8)	54.1 (34.9)	315.1 (84.7)	194.6 (68.2)	483.0 (97.7)
China (Tianjin)	463 (52.0)	9.9 (0.5)	45.2 (15.9)	12.6 (6.7)	32.6 (10.5)	293.4 (53.6)	338.6 (62.3)	564.7 (67.7)	21.9 (10.3)	24.1 (11.3)	41.6 (21.5)	279.8 (42.4)	308.4 (43.1)	521.8 (82.8)
Colombia (Bogotá)	821 (49.3)	10.5 (0.6)	68.1 (24.8)	17.9 (10.1)	50.2 (16.8)	333.0 (49.4)	401.1 (63.2)	500.1 (67.1)	46.8 (21.9)	24.0 (13.0)	62.0 (32.3)	329.1 (63.6)	187.4 (48.5)	466.0 (85.4)
India (Bangalore)	526 (45.6)	10.5 (0.5)	48.7 (20.8)	12.8 (7.8)	35.9 (14.1)	340.1 (50.5)	388.8 (60.8)	516.7 (66.2)	27.6 (13.5)	21.5 (10.7)	47.0 (27.5)	286.9 (47.8)	244.1 (37.9)	488.1 (83.2)
Kenya (Nairob)	459 (46.5)	10.3 (0.7)	71.6 (31.3)	22.5 (13.8)	49.1 (19.6)	329.9 (51.7)	401.5 (65.3)	494.7 (65.9)	37.0 (20.8)	33.7 (16.9)	74.8 (40.7)	201.5 (49.9)	314.6 (55.6)	454.3 (90.9)
South Africa (Cape Town)	391 (39.7)	10.3 (0.7)	63.5 (25.4)	17.9 (10.4)	45.6 (16.8)	321.5 (53.1)	385.0 (66.7)	489.1 (66.3)	47.2 (21.4)	16.8 (8.2)	62.8 (33.6)	260.9 (50.7)	247.8 (33.5)	443.6 (88.6)

HIC: High income countries; LMIC: Low- and middle-income countries; MVPA: moderate to vigorous physical activity; VPA: vigorous physical activity; MPA: moderate physical activity; LPA: light physical activity; TPA: total physical activity; SB: sedentary behavior; *week days (from Monday to Friday).

Figure 1. Distribution of participation frequency in Physical Education (PE) classes by study site.

List of Supplemental Digital Content

Supplemental Digital Content 1. doc(x)

Descriptive characteristics of children who were excluded for missing data and of children who participated in the present analysis.

Supplemental Digital Content 2. doc(x)

Descriptive characteristics of boys in the present study (n = 2,678).

Supplemental Digital Content 3. doc(x)

Descriptive characteristics of girls in the present study (n = 3,196).

Supplemental Digital Content 4. JPEG

Distribution of participation frequency in Physical Education (PE) classes of boys by study site (n = 2,678).

Supplemental Digital Content 5. JPEG

Distribution of participation frequency in Physical Education (PE) classes of girls by study site (n = 3,196).

Supplemental Digital Content 6. doc(x)

Distribution of the sample of boys in relation to meeting the recommendations for physical activity, and highest tertile of time in physical activity (most active) and lowest tertile of time in sedentary behavior (least sedentary) (n = 2,678).

Supplemental Digital Content 7. doc(x)

Distribution of the sample of girls in relation to meeting the recommendations for physical activity, and highest tertile of time in physical activity (most active) and lowest tertile of time in sedentary behavior (least sedentary) (n = 3,196).

Supplemental Digital Content 1. Descriptive characteristics of children who were excluded for missing data and of children who participated in the present analysis.

	Male (n = 3,422)		
	Children who were excluded for missing data (n = 744)	**Children who were included in the present analysis (n = 2,678)**	**p-value**
Age – years (Mean, S.D.)	10.4 (0.6)	10.5 (0.5)	0.95*
Level of parental education (%)			
Less high school	9.8	11.4	0.523†
Some high school	10.5	8.1	
Completed high school	22.6	23.3	
Some college	21.2	19.7	
Bachelor's degree	17.7	18.2	
Post-graduate degree	18.2	19.3	
Countries (%)			
High-income	49.9	45.0	0.06†
Low- and middle-income	50.1	55.0	
Participation frequency in Physical Education classes/week (%)			
0	6.3	6.5	0.80†
1-2	68.5	69.7	
≥ 3	25.2	23.8	
BMI z-score (WHO)			
Severe thinness	0.4	0.1	0.12†
Thinness	1.5	1.5	
Normal	60.1	64.2	
Overweight	23.4	19.1	
Obesity	14.5	15.1	
	Female (n = 3,950)		
	Children who were excluded for missing data	**Children who were included in the present analysis**	

	(n = 754)	(n = 3,196)	
Age – years (Mean, S.D.)	10.4 (0.6)	10.4 (0.5)	0.54*
Level of parental education (%)			
Less high school	11.7	10.7	0.30†
Some high school	10.1	9.2	
Completed high school	26.4	23.1	
Some college	18.5	18.8	
Bachelor's degree	16.9	16.8	
Post-graduate degree	16.4	21.4	
Countries (%)			
High-income	52.2	49.2	0.24†
Low- and middle-income	47.8	50.8	
Participation frequency in Physical Education classes/week (%)			
0	8.0	6.9	0.71†
1-2	66.6	67.5	
≥ 3	25.4	25.6	
BMI z-score (WHO)			
Severe thinness	0.0	0.2	0.88†
Thinness	1.5	1.8	
Normal	66.1	66.8	
Overweight	21.5	21.4	
Obesity	10.9	9.9	

S.D.: standard deviation; BMI: body mass index; WHO: World Health Organization; * Student's t-test; † Chi-squared test.

Supplemental Digital Content 2. Descriptive characteristics of boys in the present study (n = 2,678).

Country (site)	Age (years)	MVPA	VPA	MPA	LPA	TPA	SB	MVPA out of school*	MVPA in school*	MVPA on weekends	SB out of school*	SB in school*	SB on weekends
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
All sites	10.5 (0.5)	69.8 (25.8)	21.7 (12.2)	48.1 (15.9)	319.6 (51.5)	389.4 (63.6)	503.9 (69.9)	40.7 (20.8)	31.2 (14.9)	64.1 (34.9)	290.8 (69.1)	223.4 (60.8)	488.7 (96.6)
HIC	10.5 (0.5)	70.7 (24.2)	23.4 (12.7)	47.3 (13.9)	305.6 (47.5)	376.3 (57.8)	509.1 (68.6)	40.3 (18.5)	33.2 (13.6)	61.9 (33.2)	303.1 (63.5)	211.6 (46.5)	507.6 (97.3)
Australia (Adelaide)	10.8 (0.4)	74.9 (23.7)	26.7 (12.6)	48.2 (13.1)	313.2 (48.5)	388.1 (58.8)	470.9 (63.9)	38.6 (15.1)	41.2 (13.6)	62.0 (32.6)	270.7 (48.1)	197.6 (28.9)	487.9 (96.2)
Canada (Ottawa)	10.5 (0.3)	67.1 (19.4)	19.5 (10.0)	47.6 (11.7)	310.0 (43.6)	377.1 (51.9)	507.0 (65.9)	37.5 (14.8)	34.5 (9.4)	54.7 (25.8)	297.7 (53.6)	203.8 (26.8)	524.3 (89.3)
Finland (Helsinki, Espoo and Vantaa)	10.5 (0.4)	81.6 (27.9)	27.8 (15.5)	53.8 (15.6)	298.6 (42.8)	380.2 (58.0)	524.1 (70.6)	54.0 (24.1)	31.6 (13.2)	72.0 (38.8)	374.1 (70.2)	154.2 (37.5)	519.5 (97.0)
Portugal (Porto)	10.5 (0.2)	68.1 (23.0)	21.8 (11.5)	46.3 (13.7)	306.2 (48.6)	374.3 (58.3)	538.3 (65.1)	36.5 (16.0)	36.3 (13.5)	53.3 (29.5)	308.5 (51.6)	233.6 (33.8)	543.0 (90.0)
UK (Bath and North East Somerset)	10.9 (0.4)	73.9 (23.9)	26.0 (12.5)	47.9 (13.7)	285.5 (43.7)	359.4 (55.8)	493.4 (61.2)	42.3 (18.5)	33.9 (10.9)	65.0 (33.7)	291.7 (45.2)	213.1 (31.4)	500.3 (88.9)
USA (Baton Rouge)	10.0 (0.6)	58.1 (19.9)	18.4 (10.1)	39.7 (11.4)	318.3 (50.7)	376.4 (60.5)	512.3 (62.1)	34.1 (13.5)	19.8 (9.8)	67.9 (34.2)	270.0 (47.1)	265.6 (34.0)	454.1 (97.5)
LMIC	10.3 (0.6)	69.0 (26.9)	20.2 (11.5)	48.8 (17.5)	331.4 (51.7)	400.4 (66.2)	499.5 (70.8)	40.9 (22.4)	29.5 (15.7)	65.9 (36.2)	280.2 (71.7)	233.2 (69.1)	472.7 (92.9)
Brazil (Sao Paulo)	10.5 (0.5)	71.4 (27.9)	22.6 (13.0)	48.8 (16.9)	342.3 (52.4)	413.7 (67.8)	491.4 (70.1)	42.2 (24.2)	31.3 (21.4)	65.7 (40.2)	303.9 (88.2)	194.9 (66.1)	482.7 (101.3)

China (Tianjin)	9.9	49.5	14.1	35.4	304.6	354.1	551.6	24.2	26.0	45.2	277.0	297.4	514.2
	(0.5)	(16.2)	(7.2)	(10.7)	(51.3)	(59.2)	(64.9)	(10.8)	(11.2)	(22.2)	(42.2)	(43.3)	(80.4)
Colombia (Bogotá)	10.5	76.3	21.4	54.9	336.7	413.0	491.4	50.0	29.3	69.1	323.6	180.8	467.4
	(0.6)	(25.8)	(11.1)	(17.3)	(48.0)	(63.3)	(66.9)	(23.6)	(14.7)	(34.9)	(63.9)	(50.6)	(88.0)
India (Bangalore)	10.5	61.5	16.8	44.7	348.4	409.9	490.3	33.0	28.9	61.4	272.8	225.1	473.8
	(0.5)	(10.7)	(8.4)	(13.9)	(49.0)	(58.2)	(61.0)	(14.8)	(10.4)	(31.7)	(45.1)	(32.5)	(83.5)
Kenya (Nairob)	10.2	80.5	25.8	54.7	330.0	410.5	486.4	38.6	40.5	83.8	202.3	306.6	446.8
	(0.7)	(30.5)	(13.9)	(19.1)	(48.5)	(62.9)	(69.3)	(18.9)	(17.6)	(40.9)	(53.7)	(55.1)	(95.3)
South Africa (Cape Town)	10.4	72.8	21.2	51.6	321.6	394.4	481.2	54.9	20.2	71.5	256.5	239.9	444.3
	(0.7)	(25.9)	(10.5)	(17.0)	(51.5)	(66.2)	(70.4)	(22.6)	(8.8)	(34.7)	(52.4)	(34.6)	(95.8)

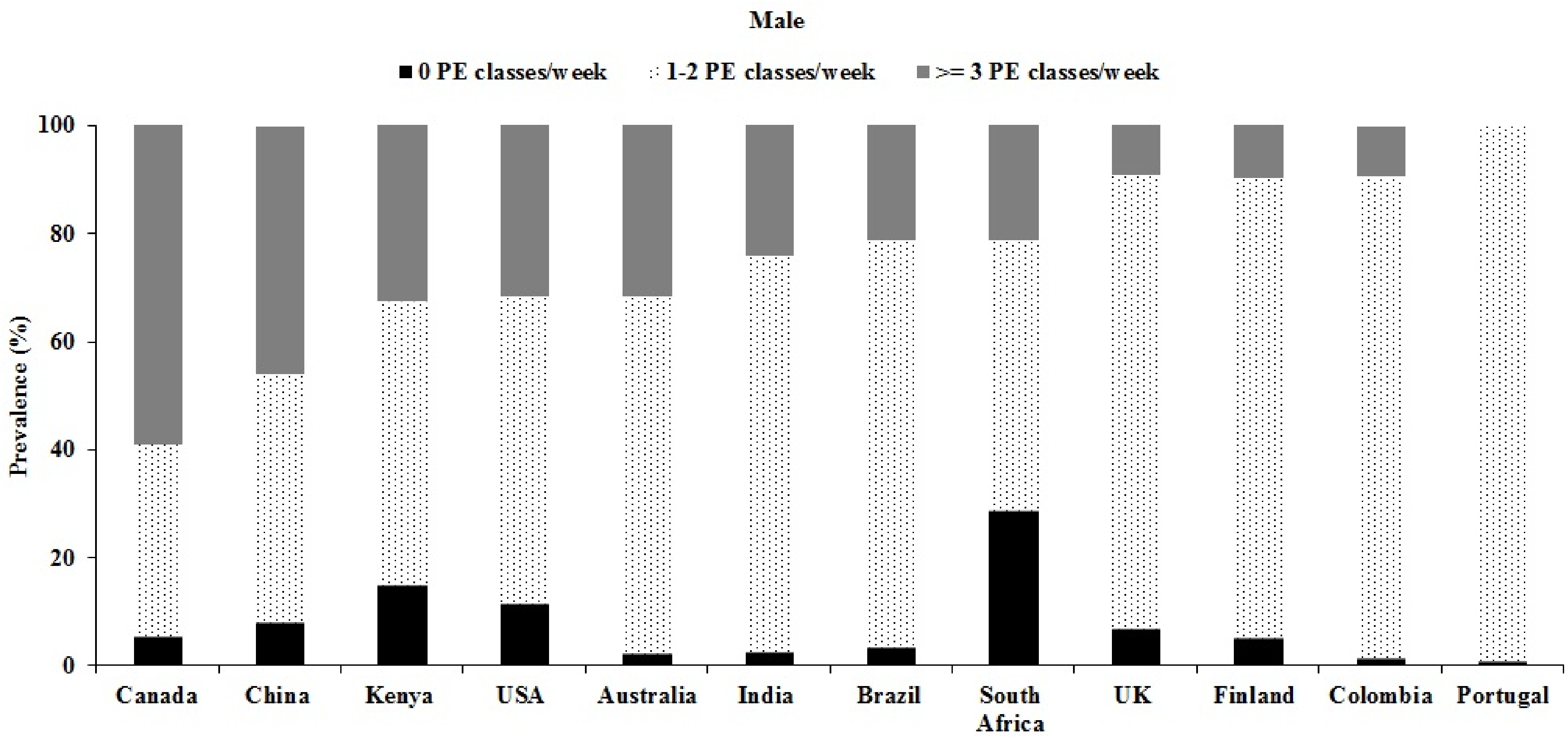
HIC: High income countries; LMIC: Low- and middle-income countries; MVPA: moderate to vigorous physical activity; VPA: vigorous physical activity; MPA: moderate physical activity; LPA: light physical activity; TPA: total physical activity; SB: sedentary behavior; *week days (from Monday to Friday).

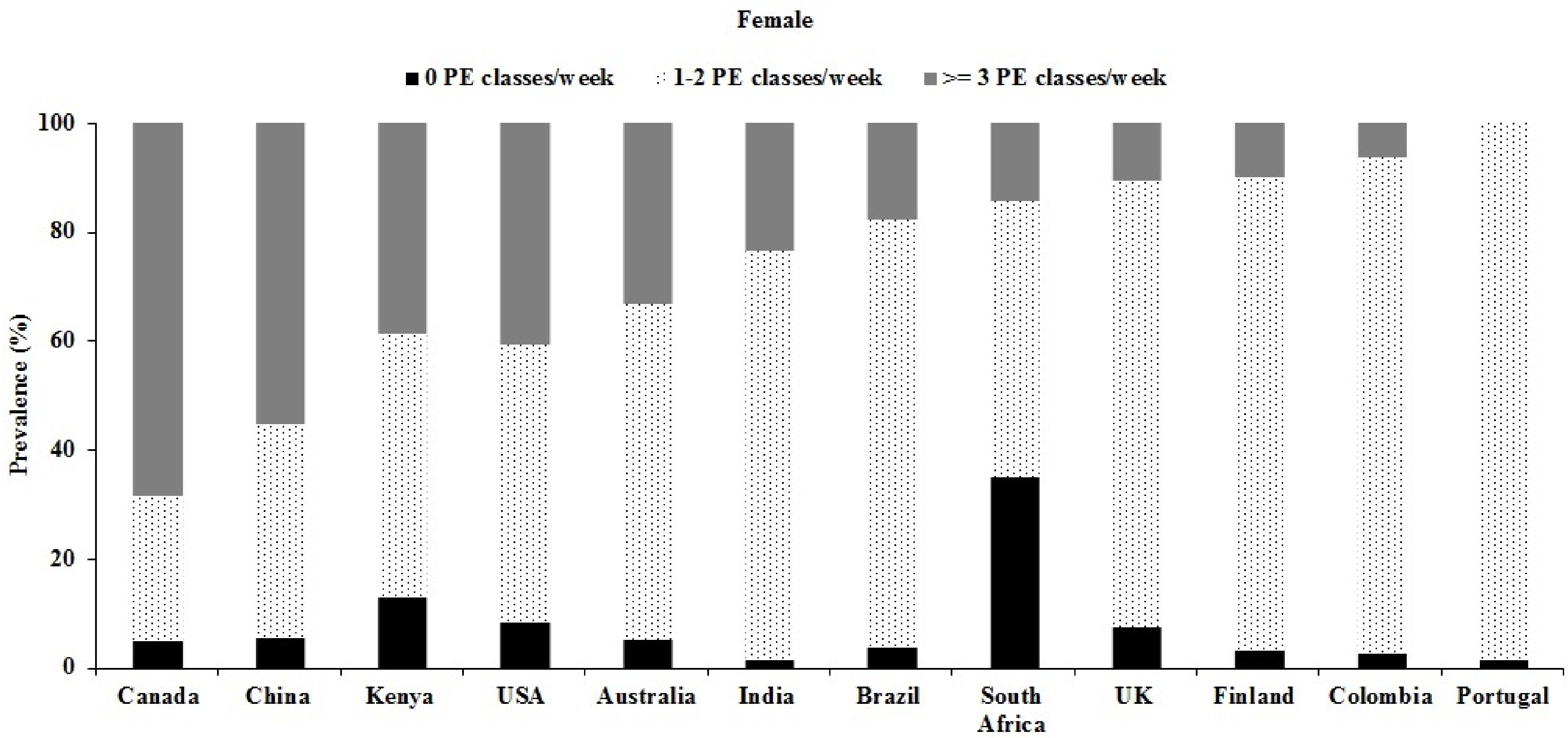
Supplemental Digital Content 3. Descriptive characteristics of girls in the present study (n = 3,196).

Country (site)	**Age (years)**	**MVPA**	**VPA**	**MPA**	**LPA**	**TPA**	**SB**	**MVPA out of school***	**MVPA in school***	**MVPA on weekends**	**SB out of school***	**SB in school***	**SB on weekends**
	Mean (S.D.)	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**	**Mean (S.D.)**
All sites	10.4	52.3	14.8	37.5	311.1	363.4	521.3	32.9	21.2	48.5	294.8	241.7	489.3
	(0.5)	(20.8)	(8.9)	(13.6)	(53.2)	(62.9)	(67.4)	(17.4)	(10.4)	(27.5)	(66.3)	(59.7)	(89.6)
HIC	10.5	52.6	15.7	36.9	299.1	351.7	521.8	31.7	23.2	46.3	301.2	233.6	502.1
	(0.5)	(18.4)	(8.8)	(11.3)	(48.5)	(56.8)	(64.7)	(14.7)	(9.6)	(24.4)	(59.4)	(45.8)	(88.0)
Australia (Adelaide)	10.7	56.9	18.9	38.0	307.5	364.4	481.7	31.4	28.6	49.8	269.4	221.7	466.2
	(0.4)	(19.1)	(9.7)	(10.8)	(47.1)	(57.5)	(56.0)	(13.3)	(9.9)	(26.8)	(43.4)	(30.3)	(80.8)
Canada (Ottawa)	10.5	52.7	14.9	37.8	300.9	353.6	514.8	28.6	26.1	46.3	294.6	223.0	513.2
	(0.4)	(16.9)	(7.6)	(10.7)	(45.4)	(54.3)	(60.6)	(12.3)	(8.8)	(22.3)	(46.2)	(29.3)	(84.2)
Finland (Helsinki, Espoo	10.5	61.5	19.2	42.3	288.8	350.4	533.1	43.9	21.9	50.5	373.4	172.2	523.5
and Vantaa)	(0.4)	(20.5)	(10.7)	(12.5)	(44.0)	(55.1)	(63.6)	(18.5)	(8.7)	(26.8)	(64.0)	(37.8)	(83.9)
Portugal (Porto)	10.4	46.7	13.0	33.7	298.4	345.1	563.4	26.4	24.1	37.6	313.5	259.3	543.7
	(0.3)	(15.1)	(6.5)	(10.0)	(50.8)	(57.6)	(56.1)	(11.3)	(9.0)	(20.0)	(46.3)	(31.0)	(78.7)
UK (Bath and North East	10.9	56.7	16.9	39.7	286.6	343.3	496.7	35.8	22.9	50.4	279.1	232.0	477.9
Somerset)	(0.4)	(17.8)	(8.7)	(11.0)	(46.9)	(54.9)	(56.9)	(14.0)	(8.7)	(25.1)	(43.3)	(28.0)	(83.4)
USA (Baton Rouge)	9.9	44.1	12.8	31.3	310.5	354.6	526.1	27.4	15.5	47.8	272.4	279.4	467.2
	(0.5)	(15.7)	(7.7)	(9.4)	(50.9)	(58.8)	(60.2)	(11.6)	(7.3)	(23.7)	(45.7)	(32.8)	(85.5)
LMIC	10.3	52.1	13.9	38.2	322.8	374.9	520.6	34.0	19.3	50.5	288.5	249.6	476.7
	(0.6)	(22.9)	(8.9)	(15.6)	(55.2)	(66.4)	(70.0)	(19.5)	(10.8)	(30.0)	(71.8)	(69.8)	(89.5)
Brazil (Sao Paulo)	10.4	47.8	12.9	34.9	333.7	381.5	509.3	31.1	18.6	43.7	324.4	194.0	482.3
	(0.5)	(18.3)	(6.4)	(13.1)	(53.6)	(64.2)	(65.7)	(16.7)	(13.1)	(24.2)	(80.7)	(70.2)	(93.4)

China (Tianjin)	9.9	40.5	11.0	29.5	281.2	321.7	578.8	19.2	22.0	37.5	283.0	320.0	530.5
	(0.5)	(14.1)	(5.6)	(9.3)	(53.3)	(61.2)	(68.0)	(8.8)	(10.8)	(19.8)	(42.4)	(39.6)	(84.5)
Colombia (Bogotá)	10.4	60.1	14.5	45.6	329.4	389.5	508.6	43.6	18.8	55.0	334.4	193.6	464.7
	(0.6)	(20.8)	(7.8)	(14.9)	(50.5)	(61.0)	(66.3)	(19.6)	(8.3)	(27.8)	(62.9)	(45.5)	(82.8)
India (Bangalore)	10.4	37.9	9.3	28.6	333.1	371.0	538.7	23.6	15.5	35.9	297.7	259.0	497.8
	(0.5)	(13.5)	(5.1)	(9.2)	(50.6)	(57.3)	(62.2)	(11.0)	(6.2)	(17.4)	(47.3)	(35.5)	(82.8)
Kenya (Nairob)	10.2	63.8	19.6	44.2	329.8	393.6	501.9	35.6	28.0	67.3	200.7	321.3	460.4
	(0.6)	(29.9)	(13.0)	(18.7)	(54.4)	(66.3)	(61.9)	(22.0)	(13.8)	(39.0)	(46.6)	(55.1)	(86.6)
South Africa (Cape Town)	10.2	57.3	15.7	41.6	321.3	378.6	494.3	43.8	14.9	60.5	261.6	251.3	438.7
	(0.6)	(23.1)	(9.7)	(15.4)	(54.3)	(66.5)	(62.9)	(19.1)	(7.0)	(32.7)	(46.7)	(31.9)	(82.6)

HIC: High income countries; LMIC: Low- and middle-income countries; MVPA: moderate to vigorous physical activity; VPA: vigorous physical activity; MPA: moderate physical activity; LPA: light physical activity; TPA: total physical activity; SB: sedentary behavior; *week days (from Monday to Friday).


Male
0 PE classes/week
1-2 PE classes/week
>= 3 PE classes/week
Prevalence (%)
0
20
40
60
80
100
Canada
China
Kenya
USA
Australia
India
Brazil
South Africa
UK
Finland
Colombia
Portugal


Female
0 PE classes/week
1-2 PE classes/week
>= 3 PE classes/week
Prevalence (%)
100
80
60
40
20
0
Canada
China
Kenya
USA
Australia
India
Brazil
South Africa
UK
Finland
Colombia
Portugal

Supplemental Digital Content 6. Distribution of the sample of boys in relation to meeting the recommendations for physical activity, and highest tertile of time in physical activity (most active) and lowest tertile of time in sedentary behavior (least sedentary) (n = 2,678).

Country (site)	**Meeting the MVPA recommendations**	**MVPA**	**VPA**	**MPA**	**LPA**	**TPA**	**SB**	**MVPA out of school**	**MVPA in school**	**MVPA on weekends**	**SB out of school**	**SB in school**	**SB on weekends**
		3rd tertile	**3rd tertile**	**3rd tertile**	**3rd tertile**	**3rd tertile**	**1st tertile**	**3rd tertile**	**3rd tertile**	**3rd tertile**	**1st tertile**	**1st tertile**	**1st tertile**
	%	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
All sites	61.2	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
HIC	64.7	33.0	38.4	30.4	22.5	24.5	29.3	31.3	40.5	31.3	23.6	35.4	25.1
Australia (Adelaide)	73.2	39.1	51.4	34.5	26.8	32.3	48.6	32.5	62.7	33.0	41.1	46.9	34.4
Canada (Ottawa)	60.1	27.2	24.4	31.5	24.9	23.9	30.5	25.4	46.9	20.1	23.0	33.0	18.7
Finland (Helsinki, Espoo and Vantaa)	78.4	50.5	52.3	46.8	15.6	26.6	24.3	58.4	33.5	42.1	4.3	85.6	21.1
Portugal (Porto)	61.0	29.0	32.7	26.4	24.5	23.0	14.5	24.5	48.9	23.7	13.5	15.3	10.6
UK (Bath and North East Somerset)	71.1	37.4	47.1	29.4	10.7	16.0	39.0	30.9	37.6	37.6	22.7	32.0	26.0
USA (Baton Rouge)	43.6	14.4	23.1	12.8	31.3	24.1	22.6	16.8	7.9	35.1	41.4	2.6	46.6
LMIC	58.2	33.5	29.4	35.9	42.9	40.8	36.6	35.2	27.3	35.1	38.6	31.2	37.3
Brazil (Sao Paulo)	64.8	36.5	39.7	36.5	48.4	42.5	39.3	39.7	36.3	34.2	34.2	59.0	35.9
China (Tianjin)	23.3	6.2	8.9	6.2	21.7	13.6	10.5	3.7	17.8	10.0	32.8	0.8	16.2
Colombia (Bogotá)	72.0	46.2	34.4	52.1	48.1	51.2	41.9	53.3	24.3	41.4	14.9	66.3	38.0
India (Bangalore)	47.8	19.7	16.1	24.1	57.0	45.8	35.7	20.3	22.0	28.6	36.1	16.2	34.0
Kenya (Nairob)	71.2	47.2	44.2	44.6	41.2	47.2	45.1	24.9	58.9	52.6	87.1	3.3	53.1
South Africa (Cape Town)	66.7	41.5	34.6	45.9	35.8	37.7	49.7	62.9	5.1	44.4	52.8	9.6	51.7

HIC: High income countries; LMIC: Low- and middle-income countries; PE: physical education; MVPA: moderate-to-vigorous physical activity; VPA: vigorous physical activity; MPA: moderate physical activity; LPA: light physical activity; TPA: total physical activity; SB: sedentary behavior.

Supplemental Digital Content 7. Distribution of the sample of girls in relation to meeting the recommendations for physical activity, and highest tertile of time in physical activity (most active) and lowest tertile of time in sedentary behavior (least sedentary) (n = 3,196).

Country (site)	**Meeting the MVPA recommendations**	**MVPA**	**VPA**	**MPA**	**LPA**	**TPA**	**SB**	**MVPA out of school**	**MVPA in school**	**MVPA on weekends**	**SB out of school**	**SB in school**	**SB on weekends**
		3rd tertile	**3rd tertile**	**3rd tertile**	**3rd tertile**	**3rd tertile**	**1st tertile**	**3rd tertile**	**3rd tertile**	**3rd tertile**	**1st tertile**	**1st tertile**	**1st tertile**
	%	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
All sites	30.4	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
HIC	30.7	33.6	37.8	30.5	23.6	25.0	32.9	29.9	42.2	30.8	27.8	32.7	27.2
Australia (Adelaide)	39.9	42.2	52.3	32.9	28.3	30.6	55.8	28.4	63.8	32.5	46.5	39.9	42.4
Canada (Ottawa)	31.6	35.5	34.2	34.5	25.0	25.3	34.9	21.1	53.5	30.8	26.4	37.5	19.4
Finland (Helsinki, Espoo and Vantaa)	51.2	53.2	53.6	46.8	12.7	23.0	24.2	60.5	37.9	41.1	1.6	87.4	19.4
Portugal (Porto)	16.5	19.1	25.1	18.2	23.9	23.1	10.8	15.1	43.8	16.4	14.0	10.4	11.5
UK (Bath and North East Somerset)	38.3	42.8	43.2	42.4	16.5	21.0	47.7	45.7	41.9	35.5	38.5	29.5	35.5
USA (Baton Rouge)	14.3	16.1	25.4	13.9	33.6	27.1	27.5	18.7	12.5	34.8	46.5	2.9	43.6
LMIC	30.0	32.6	28.7	35.6	42.9	41.2	34.3	36.6	24.7	35.7	36.0	34.0	37.2
Brazil (Sao Paulo)	25.0	28.1	27.2	30.7	49.6	44.3	36.4	30.5	24.0	29.7	23.6	72.8	35.4
China (Tianjin)	8.0	10.1	17.2	10.1	16.4	14.3	8.4	3.1	30.4	17.2	28.2	0.9	15.0
Colombia (Bogotá)	47.2	50.5	33.4	59.2	48.4	49.5	40.6	61.6	21.5	46.1	12.6	76.1	41.5
India (Bangalore)	5.7	6.4	9.1	8.1	47.8	36.7	21.5	10.7	8.6	13.1	22.0	11.0	27.8
Kenya (Nairob)	45.1	47.4	48.1	47.0	47.4	54.1	44.0	36.7	57.4	54.2	91.2	3.2	46.6
South Africa (Cape Town)	38.4	43.0	35.5	44.2	41.7	41.3	46.7	59.0	12.9	47.8	53.6	15.1	51.8

HIC: High income countries; LMIC: Low- and middle-income countries; PE: physical education; MVPA: moderate-to-vigorous physical activity; VPA: vigorous physical activity; MPA: moderate physical activity; LPA: light physical activity; TPA: total physical activity; SB: sedentary behavior.